County Treatment Needs Assessment Using Social Indicators

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Objectives

Estimating treatment need for illicit drug abuse is difficult because of social undesirability and the stigma associated with drug use. Good prevalence of alcohol use and misuse is generally obtained from household surveys. However, household surveys usually miss chronic alcohol abusers and, as a result, underestimate need for alcohol treatment in a community. Recognizing the gap in data to use as a supplement to treatment need estimates obtained from other sources (e.g., household surveys), we apply a method that will provide a scale from administrative records.

We have two major objectives in this study. First, by using social, economic and health indicators obtained from the 21 counties we will develop composite scales to help us assess their relative need for treatment of substance abuse. Our second objective is to validate the scales by relating them to treatment needs estimates obtained from independent sources, i.e, the 1998 Household Survey and the 1998 capture-recapture analysis. Parameter estimates derived from the relationship between the scales and the independently derived treatment need estimates will be used for smoothing erratic treatment need estimates as well as for short-term projection of need for treatment as needed.

Background

Social indicator approaches for the estimation of treatment needs assessment have been widely used in mental health planning (Cagel and Banks, 1986). The theoretical basis for the use

of social indicators[1] comes from the belief that social well-being (or quality of life) in a community can be measured by carefully analyzing proxies that are accessible from existing data sources. According to this approach one only needs to obtain information on characteristics of the population in, say, counties, and employ a statistical technique to arrive at relative treatment need estimates.

Zautra and Goodhart (1979) distinguish between "social" indicators and "psychological" indicators. According to them, social indicators refer to those indicators that could be used to assess the quality of life in a community. Psychological indicators, on the other hand, refer to subjective factors such as individual satisfactions, expectations, aspirations, or behavior. If one believes, as Zautra and Simons (1978) or Zautra and Goodhart (1979) do, that social and psychological indicators are related, then it is sufficient to obtain data on social (objective) indicators in a community to approximate psychological (subjective) indicators.

This grouping of indicators into “social” and “psychological” has been challenged by Schnieder (1976) and Wasserman and Chua (1980). Zautra and Goodhart (1979), however, argue that social and psychological indicators are complementary where the former "may be useful in mapping out social and economic inequalities within a community, and in identifying high risk populations, while the latter provide a more precise picture of the psychological experiences and needs of individuals within areas." This suggests that a needs assessment effort should follow a multifaceted approach to identify community needs from the needs of individuals. The success of such an effort is measured by one's ability to craft a measure that takes into account the social needs of a community with the psychological needs of its residents.

There are some advantages and disadvantages to using indicators for needs assessment.

[1] Throughout our discussion we will use terms "indicator" and "variable" interchangeably.

Kimmel (1992) lists the possibility of using existing data, the relative ease of deriving a composite index of need out of many indicators, and one's ability to fill the gap in information on treatment needs as some of the primary advantages.

Social indicators do not necessarily indicate cause and effect relationships. The application of this approach also requires a carefully worked out theoretical framework that relates a given indicator to the prevalence of substance abuse or need--a level of expertise that has been continuously improving in many states thanks to the Center for Substance Abuse Treatment's State Treatment Needs Assessment Project.

A clear weakness of most indicators is their lack of timeliness as markers of current problems (e.g., deaths due to cirrhosis). On top of this, administrative data have a lag time of 1-2 years before official release. The commonly cited problem (not a weakness) with a relative needs assessment scale is that it provides an estimate for a relative need for treatment as opposed to absolute need for treatment. Absolute need for treatment is usually obtained directly from surveys, or indirectly by applying mathematical (statistical) formulas.

The social indicator approach may draw data from a variety of sources. The selection of social indicators to be used for the construction of the scale, however, must be made with care. The use of a relative needs assessment scale as a viable treatment needs assessment measure depends on its ability to provide a sound and appealing index of need from a set of relevant indicators. The indicators must also show variation by geographic area, and be available over time.

Method

We use a fairly simple approach to estimate relative needs for treatment for the 21 counties

of New Jersey. The method we employ was proposed by Mammo and French (1996) and is known as the Relative Needs Assessment Scale (RNAS for short). RNAS fine-tunes the Social Dysfunction Scale proposed by Simeone, Frank and Aryan (1993) by introducing a weight that is more reflective of both population size and the substance use problem load in the county.

We define a county's problem load as the number of people observed (reported) with the indicator relative to the total population who were exposed (or were at risk). The general formula for the RNAS, is given in the following equation.

$$RNAS_j = \frac{\sum_{i=1}^{k} m_{ij}\grave{e}_{ij}}{\sum_{i=1}^{k}\sum_{j=1}^{J} m_{ij}\grave{e}_{ij}}, \qquad where\ \grave{e}_{ij} = \frac{V_{ij}}{\sum_{j=1}^{J} Vij} = \frac{V_{ij}}{KV_{i.}}$$

V_{ij} = the observed number of events for indicator i in county j.

m_{ij} = V_{ij}/P_{ij} is a population-based crude rate of reporting for indicator i in county j.

P_{ij} = Population at risk for indicator i in county j.

$\grave{e}_{ij}$ = is the weight associated with indicator i in county j.

$\grave{e}_{ij}$ is the proportion of people observed for indicator i in county j discounted by the total number of indicators K. Two desirable properties of $\grave{e}_{ij}$'s are that they sum to 1 and K cancels out from the equation, making the computation of the scale easier. Another desirable advantage of this scale is that it can further be refined by adjusting m_{ij}'s for social, economic and demographic differences between counties. For lack of better handling of the relative contributions of the indicators included in the model, RNAS assumes that all indicators have the same contribution to the estimation of the scale.

Data Collection and Management

Data used for indicator analysis are usually obtained from secondary sources. Because these data are already compiled by their primary users, indicator data collection becomes simple and inexpensive for the secondary user.

Secondary data, however, can easily be complex especially when no clear documentation is available on how or why they were collected. For example, surveillance systems may gather data only on a subset of subjects. Different surveillance systems may also survey different subsets of the population, thereby adding to the complexity. Even more problematic is the lack of knowledge on the extent of under coverage of the target populations, which makes it more difficult to judge the quality of data. These and other problems suggest that careful consideration should be given to issues of variable selection.

The variables included in the analysis should have theoretical and substantive relevance for what is under study and that characteristics measured through these variables should have the potential to be influenced through policy.

Any social indicator scale depends on the researcher's ability to select a sound mix of indicators that will be good enough to order geographic units according to the magnitudes of their substance abuse problems. Since we intend to track the indices over time, our indicators were selected on the basis of their continued availability and accessibility. Recent data were collected from a variety of sources for each of the 21 counties. After careful review of the county data and guided by research and our experience, a few relevant indicators were selected to compose our scale. Most data elements were derived from published records while some were obtained informally through special requests.

The Relative Needs Assessment Scale (RNAS) provides a single value for each geographic unit (county) with its magnitude showing the relative standing of each geographic unit. Because the scale sums to one, its interpretation is simpler than scores obtained from factor analysis procedures. Moreover, this scale can easily be reproduced without complex statistical computer software programs such as SAS or SPSS. It is also easy to upgrade as more data are available.

Analysis

Since alcoholism and other drug abuse may be indicated (or influenced) by different sets of factors, we developed two scales: an *alcohol scale* and a *drug scale* . The *alcohol scale* is made up of 1998 DWI arrests, 1996 alcohol attributable mortality, 1994 alcohol retail outlets and 1998 domestic violence arrests. The *drug scale* is estimated using arrests for drug possession or use in 1998, drug related mortality in 1996, IVDU AIDS cases[2] between July1997 and June 1999 and domestic violence arrests in 1998. Data on domestic violence arrests are used in both scales because of lack of clear evidence that overwhelmingly links such acts with a specific substance, although alcohol tends to dominate the relationship. Once the data were reviewed, they were entered into a Lotus 1-2-3 spreadsheet software program to construct the scales.

Appropriate populations were used to calculate problem loads (rates) for each county. In all cases the populations at risk were the most recent midyear populations in each county for age groups most relevant to have contributed to the event under observation.

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[2] We used July 1997 to June 1999 IVDU AIDS cases to minimize the erratic nature of IVDU AIDS reports. The problem was compounded by the recent fall in AIDS cases in the state.

Findings

Table 1 presents alcohol and drug scale estimates for each county. Consistent with expectation, counties vary substantially in their alcohol related relative treatment need estimates. Camden county ranks highest in its alcohol related problems with 12.2% among all counties followed by Atlantic (11.7%), Hudson (7.4), Monmouth (7.3%) and Essex (6.9%) counties. Hunterdon county had the lowest relative alcohol problem with just 0.6%. The ranks of the most affected counties have remained similar between 1993 and 1998 except Hudson's inclusion in the group (see Table 1).

The drug scale suggests that drug related problems appear to have spread into more counties. In 1993, 70% of the drug-related problem was concentrated in only seven counties: Atlantic (13.3%), Camden (9.9%), Essex (19.2%), Hudson (8.8%), Mercer (6.2%), Monmouth (5.5%), and Union (7.1%) (Mammo & French, 1998). The same seven counties accounted for only 59.7% of the drug related problems and the respective RNAS estimates for 1998 were 17.4%, 10.5%, 14.9%, 6.2%, 4.4%, 6.3%, and 7.5%. Ocean and Salem counties have shown significant increases in their relative needs estimates since 1993. The difference in drug related problems among counties is larger (coefficient of variation = .94) than differences in alcohol related problems (coefficient of variation = .64).

Table 1

Relative Needs Assessment Scale Estimates for 1993 and 1998

County	Type of Scale			
	Alcohol: (Indicators: DWI arrests, alcohol related mortality, domestic violence arrests, alcohol retail outlets)		Drug: (Indicators: Drug related mortality, IVDU AIDS cases, arrests for drug possession or use, domestic violence arrests)	
	1993	1998	1993	1998
Atlantic	0.107	0.117	0.133	0.174
Bergen	0.046	0.046	0.037	0.029
Burlington	0.048	0.046	0.025	0.031
Camden	0.112	0.122	0.099	0.105
Cape May	0.054	0.044	0.029	0.030
Cumberland	0.042	0.053	0.032	0.043
Essex	0.073	0.069	0.192	0.149
Gloucester	0.031	0.034	0.020	0.031
Hudson	0.059	0.074	0.088	0.062
Hunterdon	0.007	0.006	0.001	0.002
Mercer	0.030	0.035	0.062	0.044
Middlesex	0.057	0.046	0.038	0.033
Monmouth	0.082	0.073	0.055	0.063
Morris	0.030	0.031	0.012	0.013
Ocean	0.058	0.059	0.035	0.045
Passaic	0.042	0.036	0.037	0.031
Salem	0.014	0.017	0.008	0.011
Somerset	0.025	0.025	0.015	0.018
Sussex	0.014	0.011	0.006	0.006
Union	0.058	0.047	0.071	0.075
Warren	0.012	0.008	0.004	0.004
Total	1.000	1.000	1.000	1.000

Validating The Scales Through Modeling

To the extent that social indicators capture the substance abuse or dependence problem (i.e., need for treatment) the resulting scales (RNAS) will show strong relationships with the independently obtained prevalence estimates. If a sufficiently strong correlation is observed between the two measures, then the model can be used to smooth prevalence estimates and also provide parameter estimates for short-term forecasting of need for treatment. The degree of relationship between the two indicates the extent to which the scale is valid as a measure of relative need. It also measures the validity of the model for projecting short-term need for treatment.

We fit two models (one for alcohol and one for all drugs combined) that relate the number of adults in need of treatment to county RNAS estimates[3]. Alcohol treatment need estimates are obtained from the 1998 telephone household survey and were derived using DSM-III-R based diagnostic questions (Murray, Mammo, Ballou and Rodriguez,1999). Drug treatment need estimates were made by applying a two-sample capture-recapture method on the 1996 and 1998 alcohol and drug treatment data (Mammo, 1999). The general form of the models used to relate need for substance abuse treatment and the Relative Needs Assessment Scales (RNAS) are given as follows:

$$P_{ij} = \alpha_{i0} + \alpha_{i1} RNAS_{ij} + \varepsilon_i, \quad \varepsilon_i \sim N(0, \sigma_i^2), \quad i = Alcohol,\ Drug$$

Where, $\hat{a}_{i0}$ = the intercept term

$\hat{a}_{i1}$ = the slope parameter

[3]In 1993, we regressed the proportion of adults needing treatment on scale estimates (Mammo & French, 1998). While this still provides good fit for drugs, the alcohol model doesn't fit well and was abandoned.

$å_i$ = the error term assumed to be normally distributed about the mean 0.

$ó^2_i$ = the variance of the error terms for substance i.

$RNAS_{ij}$ = the scale estimate for substance i in county j, j = 1,2,...,21.

P_{ij} = the estimated number of adults in need of treatment for substance i in county j.

The random error term $å_i$ is assumed to be normally distributed with a constant variance. We further assume that the scale (RNAS) explains a sufficiently large part of the variation in the number of adults in need of treatment by county. This rather bold but reasonable assumption is key to our effort here. Findings of the two simple linear regression models (the alcohol model and the drug model) are discussed below. (See Appendix A for source data for the models).

The Alcohol Model

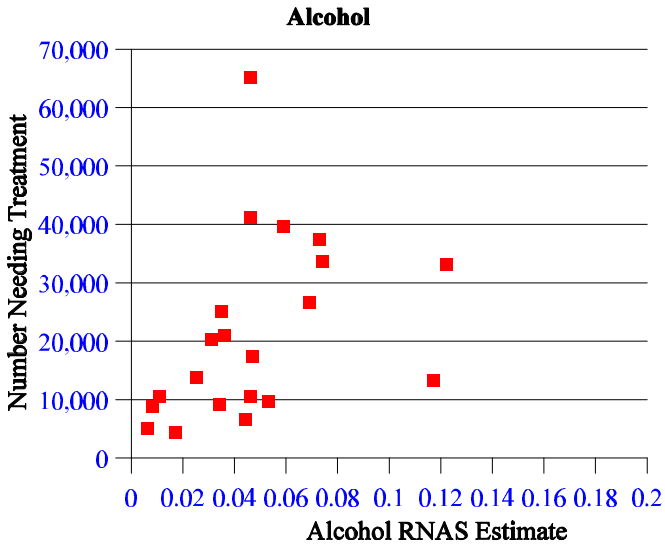
We fitted a simple linear regression model with alcohol treatment need estimates as the dependent variable and alcohol RNAS as the predictor variable. We excluded estimates for Atlantic, Bergen and Camden because of extreme values (See Scatter plot for Alcohol).

$$P_{Alcohol} = \underset{(4,671.50)}{2,923} + \underset{(104,476.19)}{404,506}\, RNAS_{Alcohol}, \quad F_{(1,16} = 14.991, \; R^2 = 48.4\%$$

Our alcohol scale explained 48.4% of the variation in alcohol treatment need estimates obtained from the household survey and that the scale is significantly correlated with the number of adults in need of treatment $P_{Alcohol}$ (p =.0014).

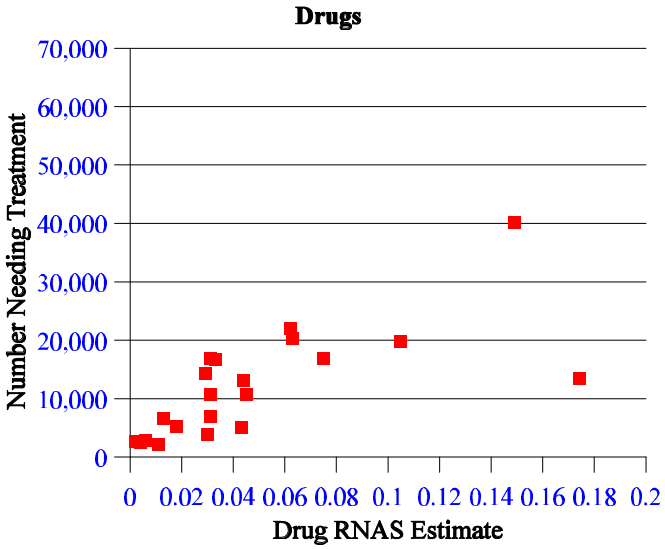
Despite the model's low predictive power (R^2 = 48.4%), the estimated parameters can be

used to smooth or predict county estimates in situations when the estimates are deemed unacceptable.



The Drug Model

We regressed the estimated number of people in need of drug treatment obtained from the capture-recapture method on our drug scale (Table 1). We dropped Atlantic county from the model because of an extreme value on the scale estimate (see scatter plot for Drugs). The fitted model suggests a strong positive relationship between estimated need for treatment and the drug scale and the scale alone explains 79.8% of the variation in county need for drug treatment. The slope parameter is also statistically significant (p =.0001).



Parameter estimates obtained from the drug model can be used to make predictions of future need for treatment in counties provided that scale estimates are available.

$$P_{Drug} = 2{,}433 + 232{,}027\ RNAS_{Drug}, \quad F_{(1,18)} = 71.2,\ R^2 = 79.8\%$$
$$(1{,}492.05) \quad (27{,}494.41)$$

Conclusions

In this paper we used the scale (RNAS) to study the relative substance abuse problems of all 21 counties in New Jersey and found different patterns for alcohol and drugs.

Contrary to common practice, we picked only few indicators to compute our scales. While the use of a large number of often highly correlated indicators may look attractive, such practice adds little or no information to our understand of the problem. Both the alcohol and drug scales are powerful tools that can be used independently or as a supplement to other treatment needs assessment data for planning purposes.

Alcohol abuse is distributed more "evenly" among counties and is used by a wide range of people compared to drug abuse. This makes the choice of variables (indicators) particularly difficult for the alcohol scale. Our effort has produced a reasonable scale which explained 48.4% of the variation in need for alcohol treatment. We continue to improve on our choice of variables as well as on our treatment need estimates as more data are available through surveys.

The drug need estimates are based on a statistical approach and need validating using a sufficiently large household survey. To the extent that we have made sound drug need estimates in the 21 counties we have managed to explain 79.8% of their variation using a single scale. Though further refinements will be made as more data are available we are greatly encouraged by the findings.

The more effort we put in constructing social indicator indices the more it has become apparent that we need a new set of surveys both to validate as well as update our findings. We have so far found no substitute for household surveys as a source for good alcohol treatment need estimates. Estimating need for illicit drug treatment using surveys remains more an exercise than a search for reliable estimates until the stigma associated with drug use is minimized. Until then, indirect approaches such as drugs RNAS can be useful alternatives to surveys.

Appendix A

Estimated proportion and number of people in need of treatment by drug type

	Scale Estimates		Alcohol (Lifetime)		Drug Treatment Need		
County	Alcohol	Drug	Number	% Needing	Number	% Needing	Total Need
Atlantic	0.117	0.174	13,416	8.8	13,486	7.6	26,902
Bergen	0.046	0.029	65,230	10.6	14,416	2.0	79,646
Burlington	0.046	0.031	10,640	4.0	10,703	3.4	21,343
Camden	0.122	0.105	33,167	10.7	19,864	5.5	53,031
Cape May	0.044	0.030	6,640	10.4	3,899	5.2	10,539
Cumberland	0.053	0.043	9,700	11.2	5,072	5.0	14,772
Essex	0.069	0.149	26,637	5.6	40,145	7.2	66,782
Gloucester	0.034	0.031	9,253	6.1	6,902	3.9	16,155
Hudson	0.074	0.062	33,652	9.3	22,114	5.2	55,766
Hunterdon	0.006	0.002	5,026	6.4	2,659	2.9	7,685
Mercer	0.035	0.044	25,175	11.8	13,163	5.3	38,338
Middlesex	0.046	0.033	41,194	8.8	16,701	3.1	57,895
Monmouth	0.073	0.063	37,528	9.8	20,369	4.6	57,897
Morris	0.031	0.013	20,377	6.8	6,737	1.9	27,114
Ocean	0.059	0.045	39,622	12.5	10,831	2.9	50,453
Passaic	0.036	0.031	21,036	6.9	16,877	4.7	37,913
Salem	0.017	0.011	4,470	11.0	2,165	4.6	6,635
Somerset	0.025	0.018	13,759	7.4	5,190	2.4	18,949
Sussex	0.011	0.006	10,500	12.1	2,984	2.9	13,484
Union	0.047	0.075	17,369	5.3	16,869	4.4	34,238
Warren	0.008	0.004	8,827	14.2	2,583	3.6	11,410
Total of Scales	1.000	1.000	453,218	8.6	253,729	4.1	706,947

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